

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
AMENDMENT OF PART 15 REGARDING)	ET Docket No. 04-37
NEW REQUIREMENTS AND)	
MEASUREMENT GUIDELINES FOR)	
ACCESS BROADBAND OVER POWER LINE)	
SYSTEMS)	

To: The Commission

CITATION OF ADDITIONAL AUTHORITY

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), by counsel, hereby respectfully submits the following citations and references as additional authority for certain of the arguments set forth in its *Petition for Reconsideration*¹ in the captioned proceeding, filed February 7, 2005, which is presently pending.

As additional authority for the arguments previously made in its Petition for Reconsideration, ARRL states as follows:

I. Interpretation of Section 301 of the Communications Act of 1934

1. In its Petition for Reconsideration filed February 7, 2005, ARRL contended at paragraph 22 thereof that *post hoc* remedies for BPL interference to licensed services were inappropriate in lieu of adequate interference prevention, because the Part 15 rules were based upon the fundamental premise, and on the condition, that

¹ The Petition for Reconsideration requests that the Commission reconsider and modify the *Report and Order* (the R&O), FCC 04-245, released October 28, 2004, 70 Fed. Reg.1360 *et seq.* The R&O amended Part 15 of the Commission's rules governing unlicensed radio frequency (RF) devices to adopt new requirements for Broadband over Power Line (BPL) technology

interference to licensed services is to be avoided *ab initio*. Were it otherwise, the Commission would have no statutory jurisdiction to permit unlicensed operation of devices or systems. 47 U.S.C. § 301. ARRL argued that the Commission's reliance on 47 C.F.R. § 15.5, which generally obligates an operator of a Part 15 device or system to avoid harmful interference to any authorized radio service or to cease operation, is misplaced: *The principal obligation of the Commission in permitting unlicensed devices or systems is to establish a radiated emission level that is sufficiently low that by their operation the devices will predictably not interfere with licensed radio services*. Unless this conclusion can be fairly reached, the Commission has no statutory authority to permit the facilities to operate on an unlicensed basis.

2. The Commission has affirmed this argument. In the *Second Report and Order and Second Memorandum Opinion and Order*, FCC 04-285, in ET Docket No. 98-153, released December 16, 2004, the Commission, with respect to Ultra-Wideband (UWB) Transmission Systems, addressed an argument made by Cingular, Inc. to the effect that the Commission had no statutory authority to authorize UWB devices, inasmuch as UWB devices are “apparatus for the transmission of energy or communications by signals by radio” and therefore must be licensed according to Section 301 of the Communications Act. Cingular argued that the statute is unambiguous on its face, and the Commission has no discretion in applying it. While the Commission rejected the premise that all RF devices, no matter how low their levels of emitted RF energy, must be licensed, it did hold that a reasonable “reading” (sic) of Section 301, consistent with Congress’ intent and subsequent legislation, would limit the licensing requirement to

“any apparatus which transmits enough energy to have a significant potential for causing harmful interference.” (*Id.*, paragraph 68).² Given the Commission’s determination when the Section 301 licensing requirement is triggered by an RF emitter, and given the permitted radiated emission levels permitted for BPL systems, BPL, though an unintentional emitter, cannot be authorized due to the acknowledged (and field-proven) substantial interference potential to licensed services.³ The solution is to establish radiated emission limits at a level that would reduce the probability of harmful interference to a negligible level.⁴

² The complete paragraph 68 reads as follows:

Cingular’s reading would require the Commission to apply Section 301’s licensing requirement to any apparatus that transmits any amount of energy, no matter how negligible. The statute does not compel that interpretation. Although Congress referred to “any apparatus,” the statute is not phrased in terms of “any” energy, “any degree” of energy, or “any level” of energy. If we read such limiting language into the statute, the Commission would be required to individually license all devices that are designed to transmit any amount of energy for any purpose, with or without effect on the use of the spectrum for communications purposes. As discussed in greater detail below, such a result would lead to irrational results and stand at odds with Congress’s recognition and tacit acceptance over the years of the Commission’s Part 15 “unlicensed” regime. A more reasonable reading of Section 301, consistent with Congress’s intent and subsequent legislation, would limit the licensing requirement to any apparatus that transmits enough energy to have a significant potential for causing harmful interference. Under our reading of the statute, the UWB transmission systems – because of their operating limits as prescribed in this proceeding – are properly classified as Part 15 devices and are not required to be licensed on a formal basis.

³ Cited herein are studies of BPL systems in Scotland by OFCOM, the telecommunications authority of the United Kingdom. The interference potential of BPL is summarized in those studies, attached hereto as Exhibits A, B and C, as follows: “In principle, [BPL] is in competition with [DSL] and Cable although, in practice, the [BPL] market share in the UK is currently extremely small as there are only a few isolated commercial trial networks in operation. One reason for this is concern over leakage emission levels. Although efficient for their primary purpose, electricity supply cables are not designed, screened or balanced for high frequency use and in this application they produce significant leakage emissions. These emissions have the potential to interfere with the reception of radio communication services, including short wave broadcasts.” (Exhibit C, Section 1, paragraph 4).

⁴ At paragraph 38 of the Report and Order in this proceeding, the Commission, without support, predicted a low interference potential from access BPL to licensed services, but that prediction relied on an inaccurate assumption of high ambient noise levels from other sources, assumptions regarding probabilities of locations of licensed stations (including public safety facilities) and a suggestion that

II. BPL Signal Decay Should Be Measured at 20 dB/Decade

3. ARRL argued at paragraph 44 of its February 7, 2005 Petition for Reconsideration that the Commission incorrectly rejected ARRL's recommendation for use of a 20 dB extrapolation factor in measuring BPL signal decay for frequencies below 30 MHz. Instead, the Commission adopted the existing 40 dB/decade factor in Part 15. The existing Part 15 standard is clearly inapplicable and underestimates the BPL field strength by up to 11.5 dB. Exhibit E attached to the ARRL Petition for Reconsideration justifies ARRL's argument on a technical basis.

4. Attached hereto as Exhibits A, B and C are reports, each published May 11, 2005, by OFCOM, the United Kingdom's telecommunications regulatory agency, concerning BPL (or PLT, as BPL is referred to in the United Kingdom) field tests conducted in Crieff, Scotland. The first study, Exhibit A, is entitled "Amperion PLT Measurements in Crieff." Exhibit B is entitled "DS2 PLT Measurements in Crieff" and Exhibit C is entitled "Ascom PLT Measurements in Winchester." The conclusions of these studies⁵ are that 20 dB/decade is appropriate for determining signal decay with distance from the source of the BPL signal, and that the FCC's adopted 40 dB/decade factor is inappropriate. According to Exhibit A at Sections 2 and 3:

licensed services apply *post hoc* interference remedies. These are not relevant to the determination whether the Commission has the authority to permit an unlicensed, unintentional radiator to operate. Rather, it must be able to determine that there is no substantial interference potential of the device or system *per se*. This, the Commission cannot reasonably conclude, and it therefore lacks the statutory authority to permit BPL at the radiated emission levels adopted in the Report and Order.

⁵ These studies are submitted as additional authority for the argument that 20 dB/decade should be used rather than 40 dB/decade for signal decay with distance from BPL lines. However, these studies also sharply demonstrate, via field test results, that notching of BPL systems is ineffective as an interference mitigation tool, and that certain BPL systems cannot possibly meet the Commission's Part 15 radiated field strength limits, which are overly liberal with respect to BPL systems in any case.

Particular interests were the rate at which PLT leakage emission levels decay with distance from their source and the effectiveness of any mitigation measures that can be applied by PLT manufacturers and operators to reduce any adverse impact of these leakage emissions on radio reception.

Below 30 MHz the magnetic field regression, measured at 10, 30, 100 and 300 metres from the overhead line, was approximately 27 dB/decade and the electric field regression, over the same path, varied between approximately 16 and 21 dB/decade. Above 30 MHz the electric field regression, measured at 10, 30, 100, 300, 1000 and 3000 metres from the overhead line, varied between 10 and 20 dB/decade.

Exhibit B states in Section 3 as follows:

The leakage emission levels measured were as expected, having regard to the measurement position, distance from the source, power applied and the results of previous work.

Finally, Exhibit C states, in Section 3, as follows:

The rate at which PLT leakage emissions reduce in level (regress) as the distance from the network is increased is an important factor in assessing the interference potential of PLT networks. The regression characteristic is also needed to reference emission levels, or limits, measured at one distance to those made at other distances.

Using a high sensitivity broadband loop antenna, it was found that emissions from the Chaundler Road access network, measured at 1, 3, 10, 30 & 100 metre distances, demonstrated a regression rate of approximately 20 dB per decade of distance ($1/r$).

At the time of testing, the Chaundler Rd substation had no active PLT customers so it was not possible to measure the regression from an in-house PLT network, although it is predicted that a ($1/r$) curve would also apply in this case.

5. In addition to the foregoing authorities, measurement of signal decay for Part 18 Industrial, Scientific and Medical devices, which, pursuant to Section 18.301 of the Commission's rules, can operate at frequencies below 30 MHz, is done on the basis of

20 dB/decade. At Section 18.305, note 2, the Commission holds that, in determining field strength at certain distances:

Testing for compliance with these limits may be made at closer distances, provided a sufficient number of measurements are taken to plot the radiation pattern, to determine the major lobes of radiation, and to determine the expected field strength level at 30, 300 or 1600 meters. Alternatively, if measurements are made at only one closer fixed distance, then the permissible field strength limits shall be adjusted using $1/d$ as an attenuation factor.

It is apparent, therefore, that in comparable circumstances, the 20 dB/decade attenuation factor should be applied to BPL systems as a means of determining actual field strength of BPL signals.

6. To resolve any lingering doubt, attached hereto as Exhibit D is CISPR Amendment Document 18-2 (1996) entitled *Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment – Part 2: Methods of Measurement and Procedure for Determining Limits*. The graph at Figure 17 shows distance extrapolation. On 10 MHz and above, it is 20 dB/decade. At 1 MHz, it is 32 dB/decade. The formula ARRL recommended to the Commission to calculate extrapolation is as follows: Distance at 30 meters = distance at slant range – $20 \log (30/\text{slant range}) - 20 \log (15/\text{frequency in Megahertz})$. On 15 MHz, this is exactly 20 dB/decade. On 1 MHz, this is 31.8 dB/decade. The CISPR standard for extrapolated measurement of signal attenuation is consistent with use of 20 dB/decade and rebuts the Commission's use of 40 dB/decade.⁶ At paragraph 109 of the Commission's Report and Order in this proceeding, the Commission stated that, given the "lack of conclusive

⁶ The German regulation, RegTP 322 MV 05, the test procedure that is stipulated for those who must follow the requirements of NB-30 in Germany, specifies at Section 5.2 thereof a 20 dB/decade extrapolation below 30 MHz. See, <http://www.arrl.org/~ehare/bpl/RegTP322_Translation.doc>

experimental data pending large scale Access BPL deployments,” it would continue the use of the existing Part 15 distance extrapolation factors in its rules. but with slant range rather than horizontal distance. However, it stated that “[i]f new information becomes available that alternative emission limit/distance standards or extrapolation factors would be more appropriate, we will revisit this issue at another time.” There is no time like the present.

Therefore, ARRL, the National Association for Amateur Radio, respectfully requests that the Commission consider these additional citations of authority supporting certain of the arguments set forth in the Petition for Reconsideration filed by ARRL on February 7, 2005. ARRL again requests that the Commission reconsider, rescind and re-study in further proceedings the rules governing Access Broadband Over Power Line systems in accordance with the foregoing.

Respectfully submitted,

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